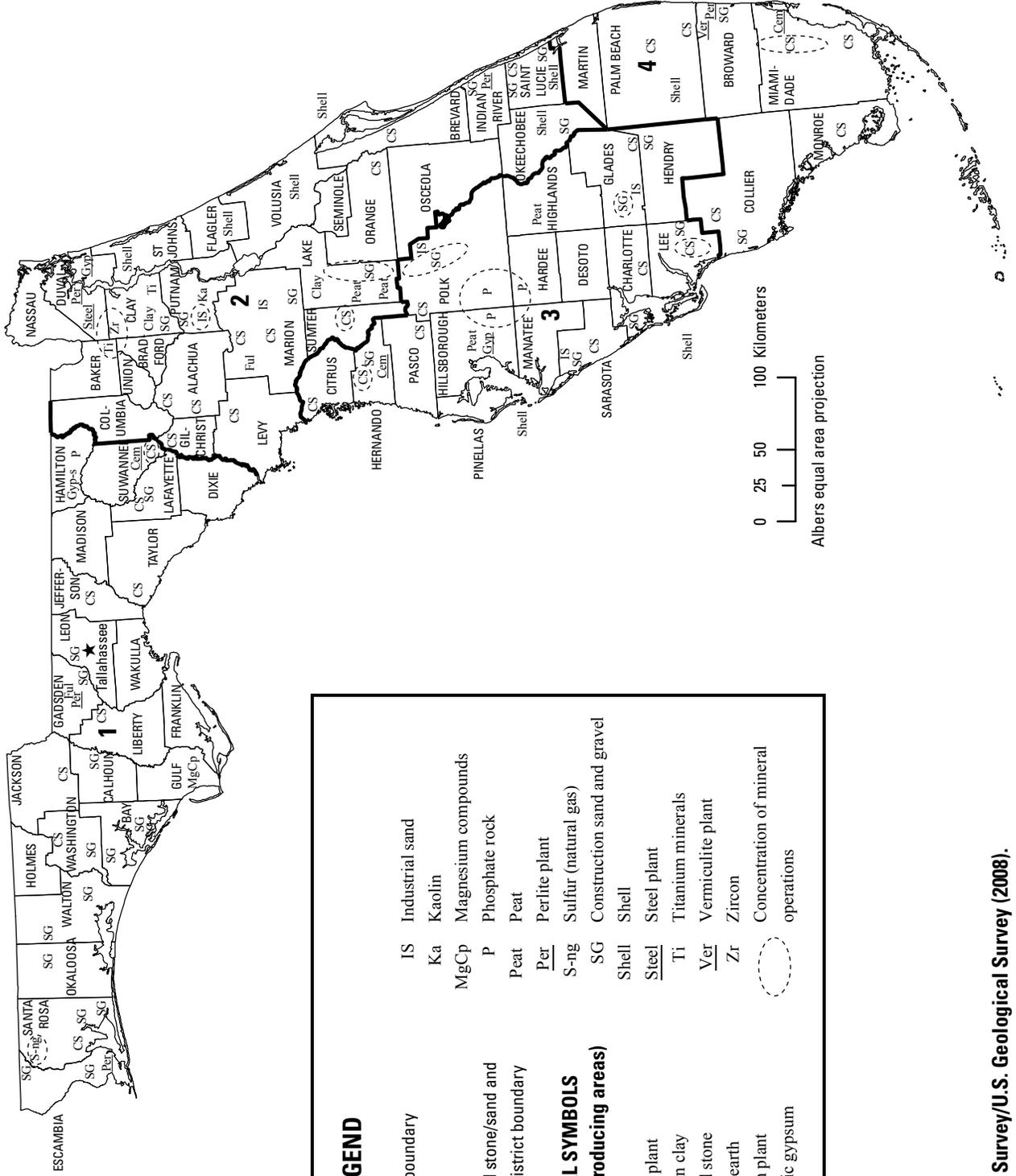




2008 Minerals Yearbook

FLORIDA

FLORIDA



LEGEND

- County boundary
 - ★ Capital
 - City
 - 1— Crushed stone/sand and gravel district boundary
- MINERAL SYMBOLS**
(Principal producing areas)
- Cem Cement plant
 - Clay Common clay
 - CS Crushed stone
 - Ful Fuller's earth
 - Gyp Gypsum plant
 - Gyp-s Synthetic gypsum
 - IS Industrial sand
 - Ka Kaolin
 - MgCp Magnesium compounds
 - P Peat
 - Per Perlite plant
 - S-ng Sulfur (natural gas)
 - SG Construction sand and gravel
 - Shell Shell
 - Steel Steel plant
 - Ti Titanium minerals
 - Ver Vermiculite plant
 - Zr Zircon
 - Concentration of mineral operations

THE MINERAL INDUSTRY OF FLORIDA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Florida Geological Survey for collecting information on all nonfuel minerals.

In 2008, Florida's nonfuel raw mineral production¹ was valued at \$3.73 billion, based upon annual U.S. Geological Survey (USGS) data. This was a \$325 million, or a 9.6%, increase from the State's total of \$3.40 billion in 2007, which then had increased by \$161 million, or more than 5%, from that of 2006. The State rose to fifth in rank (sixth in 2007) among the 50 States in total nonfuel mineral production value, of which the State accounted for nearly 5.25% of the U.S. total.

Florida continued to lead the Nation in phosphate rock mining in 2008, producing more than four times as much as the next highest producing State. Phosphate rock was the leading mineral commodity produced in Florida, followed by crushed stone, cement (portland), construction sand and gravel, and zirconium concentrates, the combined values of which represented 97% of the State's total nonfuel mineral value.

In 2008, the largest portion of Florida's increase in production value was from the increase in phosphate rock production value, followed by the increases in the production value of fuller's earth clays and magnesium compounds. The most significant decreases in production value were crushed stone, down by \$257 million, masonry cement, down by \$39 million, common clays (data withheld—company proprietary data), and zirconium concentrates (data withheld—company proprietary data). This was followed by decreases in the production value of kaolin, down by 9%, industrial sand and gravel, down by 8%, portland cement, down by 7%, and lime (data withheld—company proprietary data). Smaller decreases also took place in construction sand and gravel, ilmenite, and peat.

In 2008, Florida continued to be the only State to produce rutile and staurolite. The State remained first in the quantity of phosphate rock and peat (listed in descending order of value); second in the production of ilmenite (a titanium mineral concentrates); third in the production of magnesium compounds; and fourth in portland cement. Florida rose in rank to seventh from eighth in the production of kaolin and decreased to second from first of two States that produce zircon concentrates, to third from first in the production of masonry cement, to fourth from third in crushed stone, and sixth from fifth in the production of fuller's earth clay.

The Florida Geological Survey² (FGS), an Office of the Florida Department of Environmental Protection (FDEP), provided the following narrative information. Production and other data in the following text are those reported by the FGS,

¹The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2008 USGS mineral production data published in this chapter are those available as of July 1, 2010. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals>.

²Clint Kromhout, P.G., Geologist/Environmental Specialist III, authored the text of the State mineral industry information provided by the Florida Geological Survey.

based upon that agency's own surveys and estimates. The FGS data may differ from some production figures reported to the USGS.

Exploration and Development

In 2008, the State issued 27 new permits (19 limerock, 7 sand, and 1 heavy mineral) for mining encompassing 4,800 hectares (ha). Permits were issued for the expansion or modification of 32 existing operations that encompassed 2,800 ha. E.I. du Pont de Nemours and Co. (DuPont) was approved to develop its heavy-mineral mine located in Maxville, Duval County adding 2,100 ha to its operation. The Palm Beach County Commission approved new aggregate mines, encompassing approximately 4,400 ha operated by CEMEX S.A.B de C.V. and Vulcan Materials Company, and one 200 ha mine expansion by Bergeron Sand Rock & Aggregate Inc. The Florida City Commission approved Atlantic Civil Constructors Corp.'s expansion of the aggregate mining operation to 240 ha located in Miami-Dade County.

Commodities Review

Industrial Minerals

The onset of the economic recession, coupled with a declining housing market and increasing home insurance and tax rates, continued to slow Florida's population growth rate in 2008. The annualized rate of population growth mid-year was 0.6%, down from 1.0% in 2007 and rates as high as 2.0% in prior years (U.S. Census Bureau, 2010). As a result, Florida's construction materials production continued to decline in 2008, down approximately 24% for aggregate and 12% for all of cement (masonry and portland cement).

Cement.—High purity limestone was used to manufacture the clinker for cement. Florida remained third, nationally, in total cement production. At yearend, American Cement Co., LLC finished construction of its new cement plant at Sumterville, Sumter County (van Oss, 2008).

Clays.—Fuller's earth clays and kaolin were mined in several locations within the State. The State's fuller's earth clays were mainly of two different types, attapulgite and montmorillonite. In 2008, Florida ranked first (second in 2007), nationally, in the production of attapulgite. The gellant grades of attapulgite were particularly useful as thickeners in such items as drill muds and paints, although they also were used in fertilizer carriers, desiccants, oil and grease absorbents, other filler and extender applications, and various other products. The two dominant markets for the montmorillonite variety of fuller's earth were pet litter and oil and grease absorbents, while other major markets included civil engineering applications and as pesticide carriers. The State's kaolin was used in ceramics manufacturing, as well

as in the production of pigments and paper, and in refractories (Virta, 2008).

Phosphate Rock.—Florida’s phosphate rock production increased slightly compared with that of 2007. Three companies conducted phosphate rock mining—Mosaic Co. (five mines), CF Industries (one mine), and PCS Phosphate Co (one mine) in the counties of Hamilton, Hardee, Hillsborough, Manatee, and Polk. Three new mines were planned for the next decade to replace existing operations and were in the permitting process. In late 2007 and continued into 2008, increased agricultural demand and tight supplies caused a dramatic increase in the price of phosphate rock (Jasinski, 2009). Phosphate rock was used primarily for producing phosphoric acid utilized in the manufacture of fertilizer; other use included additives to animal feed (Jasinski, 2008).

Sand and Gravel, Construction, and Stone, Crushed.—In 2008, Florida’s crushed stone aggregate production was 68 million metric tons (Mt), 24% less than the production of 2007. The total crushed stone imported to Florida from Mexico was counted in the total of crushed stone sold or used in Florida (Willett, 2008). The decrease in the aggregate production was attributed to three factors: 1) a continued prolonged decline in the residential and commercial real estate industry, 2) the temporary closure of large-scale mines in the State’s Lake Belt region, and 3) several key aggregate counties imposing mining moratoriums.

Metals

Titanium and Zirconium.—In 2008, DuPont and Iluka Resources Ltd. continued the production of ilmenite, rutile, and zirconium concentrates. The two companies continued to operate heavy-mineral sand mines in Baker, Bradford, Clay, and Duval Counties. The Florida mines near Starke City typically produce a mixed product containing ilmenite, leucosine, and rutile that was used as feedstock in DuPont’s titanium oxide pigment plants (Gambogi, 2009a). The mining in Green Cove Springs City was limited to reprocessing of tailings to recover zircon (Gambogi, 2009b). Ilmenite, leucosine, and rutile are the primary minerals used in the manufacture of titanium dioxide pigments, and zirconium mineral concentrates are primarily used in ceramics opacification, foundry sands, and refractories. There was a slight decrease in the production of ilmenite in Florida.

Environmental Issues, Mining Moratoriums, and Reclamation

In recent years, environmental concerns such as potential contamination of freshwater aquifers, blasting, dust, and truck traffic issues have been at the forefront during the mine permitting process in Florida. In some areas, housing development was adjacent to minable lands. Communities generally understand the need for mining to contribute to the State’s economic growth but at the same time recognize the environmental fragility of many potentially productive mining areas. The result has been ongoing revision of local mining regulations, lengthy permitting processes and, in some cases, mining moratoriums.

Palm Beach County also invoked a mining moratorium on the approximate 283,000 ha Everglades Agricultural Area (EAA) to further research environmental impacts of mining. The primary concerns were: 1) the potential impact to the Everglades surface water flow, 2) lowering of the potentiometric surface in the regional surficial aquifer system, and 3) the potential increase in mercury concentrations from leaching of the EAA’s mucky soils during mining. In April and May, Palm Beach County approved two new mines and expansion of a third in or near the EAA. The Lake Harbor Quarry included 3,000 ha, 6 kilometers (km) south of Lake Okeechobee. South Bay Quarry covered 1,500 ha situated 16 km south of Belle Glade City. The County authorized the expansion of operations Bergeron Sand Rock & Aggregate Inc. to 200 ha. Environmental groups initiated a legal challenge to the mines on the basis that officials failed to address concerns that long-term mining could contaminate water supplies and interfere with Everglades’s restoration efforts.

Lee County initiated a 1-year moratorium on mining in its southeastern region. Indian River County enacted a temporary mining moratorium to allow time to devise better protection for its groundwater. Citrus County enacted a similar moratorium, and adjacent Levy County was considering a proposal from Tarmac America LLC to mine limerock on 2,000 ha of a 4,000-ha tract near the town of Inglis.

Mosaic Fertilizer Co. sought permits to mine the approximately 2,000-ha Ona-Ft. Green Mine extension located in Hardee County. A legal challenge brought on by Charlotte, Lee, and Sarasota Counties citing potential mining impacts to the Peace River corridor continued to stall their efforts.

In response to the temporary closures of 12 Lake Belt Area mines in 2006 and the Florida Department of Transportation strategic aggregates study, Florida’s legislature created a “Strategic Aggregates Review Task Force.” The closures resulted from a 2005 lawsuit challenging the permits issued to the mines. The challengers argued that the environmental impact statement (EIS) prepared by the Army Corps of Engineers and the U.S. Department of the Interior’s Fish and Wildlife Service did not adequately assess the danger posed to Miami-Dade’s drinking water supply and could contribute to destroying Everglades’ wetland habitats owing to benzene having been identified in one of the Miami-Dade’s well field wells. The U.S. District Judge required the Army Corps of Engineers to draft a supplemental EIS for the mining permit areas before the temporary closures could be lifted. The Task Force presented its final report to the Governor in February.

In April, the 11th District Court of Appeals overturned an injunction that had halted mining in the Lake Belt area of Miami-Dade County. Mining was expected to resume, but the timing and scale of operations will likely be moderated by economic conditions.

Florida Department of Environmental Protection (FDEP) records indicated that 69% of land mined for phosphate has been reclaimed (Florida Department of Environmental Protection, 2008). Since July 1975, Florida has required that all mined lands be reclaimed, as administered by FDEP’s Bureau of Mine Reclamation. Mined phosphate land totaled approximately 80,000 ha (approximately 51,000 ha having been reclaimed).

Governmental Programs

The FGS has been an active participant in the STATEMAP Program. STATEMAP is a component of the congressionally mandated National Cooperative Geologic Mapping Program (NCGMP), through which the USGS distributes Federal funds to support geologic mapping efforts through a competitive funding process. The NCGMP has three primary components: (1) FEDMAP, which funds Federal geologic mapping projects (2) STATEMAP, which is a matching-funds grant program with State geological surveys, and (3) EDMAP, a matching-funds grant program with universities that has a goal to train the next generation of geologic mappers. The FGS completed geologic mapping for the western portion of the USGS 1:100,000-scale Perry quadrangle. The products included a geologic map, cross sections, and a physiographic regions map. Several cores were drilled and numerous hand samples were taken and archived in the FGS State Geologic Sample Repository for future reference. The maps and cross sections are available as part of the FGS Open-File Map Series (Green and others, 2008a) and FGS Open File Report (Green and others, 2008b).

References Cited

Florida Department of Environmental Protection, 2008, Rate of Reclamation Report July 1, 1975 through December 31, 2008: Florida of Environmental Protection, p. 6. (Accessed November 1, 2010, at <http://www.dep.state.fl.us/water/mines/docs/2008-rate-of-reclamation.pdf>.)

Gambogi, Joseph, 2009, Titanium mineral concentrates: U.S. Geological Survey Mineral Commodity Summaries 2009, p. 174–175. (Accessed November 1, 2010, at <http://minerals.usgs.gov/minerals/pubs/commodity/titanium/mcs-2009-timin.pdf>.)

Gambogi, Joseph, 2010, Titanium [Advance Release], *in* Metals and minerals: U.S. Geological Survey Minerals Yearbook 2008, v. I, April, p. 78.1–78.16. (Accessed November 1, 2010, at <http://minerals.usgs.gov/minerals/pubs/commodity/titanium/myb1-2008-titan.pdf>.)

Green, R.C., Paul, D.T., Wagner, D.J., Kromhout, C., and Scott, T.M., 2008a, Geologic map of the western portion of the U.S.G.S. Perry 30 x 60 minute quadrangle, northern Florida: Florida Geological Survey Open-File Map Series 99, 3 plates.

Green, R.C., Paul, D.T., and Scott, T.M., 2008b, Text to accompany the geologic map of the western portion of the U.S.G.S. Perry 30 x 60 minute quadrangle, northern Florida, Open File Map Series 99: Florida Geological Survey Open-File Report 92, 35 pages.

Jasinski, S.M., 2010, Phosphate rock [Advance Release], *in* Metals and minerals: U.S. Geological Survey Minerals Yearbook 2008, v. I, March, p. 56.1–56.4. (Accessed November 1, 2010, at http://minerals.usgs.gov/minerals/pubs/commodity/phosphate_rock/myb1-2008-phosp.pdf.)

Jasinski, S.M., 2009, Phosphate rock: U.S. Geological Survey Mineral Commodity Summaries 2009, p. 120–121. (Accessed November 1, 2010, at http://minerals.usgs.gov/minerals/pubs/commodity/phosphate_rock/mcs-2009-phosp.pdf.)

U.S. Census Bureau, 2010, Table 2. Cumulative estimates of resident population change for the United States, Regions, States, and Puerto Rico and Region and State rankings—April 1, 2000 to July 1, 2009 (NST-EST2009-02): U.S. Census Bureau, Population Division, December, 2009. (Accessed November 1, 2010, at <http://www.census.gov/popest/states/NST-pop-chg.html>.)

van Oss, H.G., 2010, Cement [Advance Release], *in* Metals and minerals: U.S. Geological Survey Minerals Yearbook 2008, v. I, September, p. 16.1–16.38. (Accessed January 10, 2011, at <http://minerals.usgs.gov/minerals/pubs/commodity/cement/myb1-2008-cemen.pdf>.)

Virta, R.L., 2008, Clay and shale, *in* Metals and minerals: U.S. Geological Survey, Minerals Yearbook 2007, v. I, p. 18.1–18.24.

Willett, J.C., 2008, Stone, crushed [Advance Release], *in* Metals and minerals: U.S. Geological Survey Minerals Yearbook 2008, v. I, March, p. 71.1–71.27. (Accessed November 15, 2010, at http://minerals.usgs.gov/minerals/pubs/commodity/stone_crushed/myb1-2008-stonc.pdf.)

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN FLORIDA^{1,2}

(Thousand metric tons and thousand dollars)

Mineral	2006		2007		2008	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	900	146,000 ^e	524	86,100 ^e	310	47,000 ^e
Portland	5,880	602,000 ^e	5,510	557,000 ^e	4,980	518,000 ^e
Clays:						
Common	3	W	3	W	2	W
Kaolin	23	2,900	21	2,770	19	2,520
Gemstones, natural	NA	1	NA	1	NA	1
Peat	496	10,000	501	9,800	488	9,760
Sand and gravel:						
Construction	40,000	266,000	30,300	231,000	28,100	219,000
Industrial	500	8,050	441	8,110	573	7,480
Stone, crushed	134,000	1,400,000	96,400 ^f	1,150,000 ^f	68,300	892,000
Combined values of clays (fuller's earth), lime, magnesium compounds, phosphate rock, staurolite, titanium concentrates, zirconium concentrates, and values indicated by symbol W	XX	810,000	XX	1,360,000	XX	2,040,000
Total	XX	3,240,000	XX	3,410,000 ^f	XX	3,730,000

^eEstimated. ^fRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined values" data.

XX Not applicable.

¹Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

²Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
FLORIDA: CRUSHED STONE SOLD OR USED, BY TYPE¹

Type	2007			2008		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone ²	85 ^r	92,500 ^r	\$1,110,000 ^r	86	65,800	\$865,000
Dolomite	3	234	1,540	4	923	8,510
Shell	5	2,850	24,200	3	475	3,710
Sandstone	-- ^r	-- ^r	-- ^r	--	--	--
Miscellaneous stone	3 ^r	779 ^r	9,390 ^r	3	1,120	14,300
Total	XX	96,400 ^r	1,150,000 ^r	XX	68,300	892,000

^rRevised. XX Not applicable. -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
FLORIDA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2008, BY USE¹

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	50	1,350
Filter stone	W	W
Other coarse aggregate	110	1,810
Coarse aggregate, graded:		
Concrete aggregate, coarse	2,640	40,700
Bituminous aggregate, coarse	443	5,530
Other graded coarse aggregate	6,270	166,000
Fine aggregate (-¾ inch):		
Stone sand, concrete	643	6,050
Stone sand, bituminous mix or seal	572	6,030
Screening, undesignated	1,980	22,800
Other fine aggregate	5,070	102,000
Coarse and fine aggregates:		
Graded road base or subbase	8,900	60,800
Unpaved road surfacing	W	W
Crusher run or fill or waste	2,490	15,000
Other coarse and fine aggregates	3,880	47,200
Other construction materials	318	2,270
Agricultural, limestone	W	W
Chemical and metallurgical, cement manufacture	W	W
Special, other fillers or extenders	W	W
Other miscellaneous uses and specified uses not listed	227	3,180
Unspecified: ²		
Reported	21,300	250,000
Estimated	8,300	110,000
Total	68,300	892,000

W Withheld to avoid disclosing company proprietary data; included in "Total."

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Reported and estimated production without a breakdown by end use.

TABLE 4
FLORIDA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2008, BY USE AND DISTRICT¹

(Thousand metric tons and thousand dollars)

Use	Districts 1 and 2 ²		Districts 3 and 4 ²	
	Quantity	Value	Quantity	Value
Construction:				
Coarse aggregate (+1½ inch) ³	W	W	236	3,220
Coarse aggregate, graded ⁴	2,160	45,900	7,190	166,000
Fine aggregate (-¾ inch) ⁵	1,340	26,200	6,930	111,000
Coarse and fine aggregates ⁶	9,730	72,200	5,730	53,400
Other construction materials	--	--	318	2,270
Agricultural ⁷	W	W	W	W
Chemical and metallurgical ⁸	--	--	W	W
Special ⁹	--	--	W	W
Other miscellaneous uses	--	--	227	3,180
Unspecified: ¹⁰				
Reported	2,860	39,300	18,400	211,000
Estimated	3,800	52,000	4,500	61,000
Total	20,100	238,000	48,300	654,000

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Specified districts are combined to avoid disclosing company proprietary data.

³Includes filter stone, riprap and jetty stone, and other coarse aggregate.

⁴Includes concrete aggregate (coarse), bituminous aggregate (coarse), and other graded coarse aggregate.

⁵Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

⁶Includes crusher run or fill or waste, graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.

⁷Includes agricultural limestone.

⁸Includes cement manufacture.

⁹Includes other fillers or extenders.

¹⁰Reported and estimated production without a breakdown by end use.

TABLE 5
FLORIDA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2008,
BY MAJOR USE CATEGORY¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products ²	7,590	\$70,181	\$9.25
Asphaltic concrete aggregates and road base materials ³	1,226	12,698	10.36
Fill	2,720	7,823	2.88
Other miscellaneous uses ⁴	340	3,164	9.31
Unspecified: ⁵			
Reported	5,593	41,451	7.41
Estimated	10,659	83,420	7.83
Total or average	28,128	218,737	7.78

¹Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

²Includes plaster and gunite sands.

³Includes road and other stabilization (cement).

⁴Includes snow and ice control.

⁵Reported and estimated production without a breakdown by end use.

TABLE 6
 FLORIDA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2008, BY USE AND DISTRICT¹

(Thousand metric tons and thousand dollars)

Use	Districts 1 and 2 ²		Districts 3 and 4 ²	
	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products ³	6,501	60,925	1,090	9,256
Asphaltic concrete aggregates and road base materials ⁴	295	3,450	931	9,248
Fill	1,887	4,444	833	3,378
Other miscellaneous uses ⁵	96	1,109	244	2,056
Unspecified: ⁶				
Reported	769	5,663	4,824	35,789
Estimated	6,382	49,949	4,277	33,472
Total or average	15,929	125,539	12,198	93,199

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses."

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Districts 1 and 2, 3 and 4 are combined to avoid disclosing company proprietary data.

³Includes plaster and gunite sands.

⁴Includes road and other stabilization (cement).

⁵Includes golf course.

⁶Reported and estimated production without a breakdown by end use.